

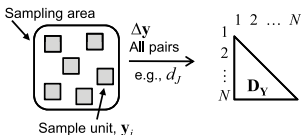
VARIATION

Mission statement

Schematic representation

Analysis

V1. Measure variation among communities from a set of samples.



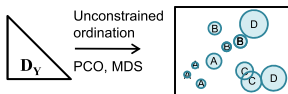
Calculate one or more of:

$$\beta_W, \beta_{Add}, \bar{d}_{cen}$$

or

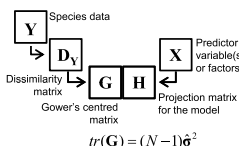
$$\hat{\sigma}^2 = \frac{1}{(N-1)} \left(\sum_{i,j < j} d_{ij}^2 / N \right)$$

V2. Explore relationships between community structure and factors or environmental variables.



Visualise patterns in an ordination (e.g., PCO or MDS), Superimpose labels, bubbles, vectors, etc.

V3. Partition variation in community structure according to some factors or continuous (spatial/environmental) variables.



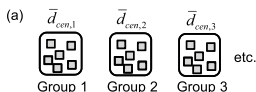
Linear or non-linear RDA (Euclidean), CCA (chi-squared) or dbRDA (other measures).

Explained: $tr(\mathbf{HG})$

Residual: $tr((\mathbf{I} - \mathbf{H})\mathbf{G})$

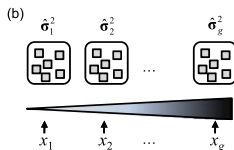
Total SS: $tr(\mathbf{G})$

For dbRDA, partitioning is done on Gower's centred matrix (\mathbf{G}); for RDA, partitioning is done on the SSCP matrix of \mathbf{Y} .



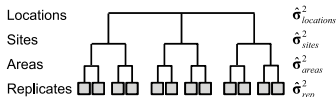
For (a), do a test for homogeneity of multivariate dispersions.

V4. Compare variation either (a) among *a priori* groups or (b) along a continuous gradient.



More generally (for a or b), fit a linear or non-linear model of $\hat{\sigma}_i^2$ or $\bar{d}_{cen,i}$ vs \mathbf{x} . ($i = 1, \dots, g$)

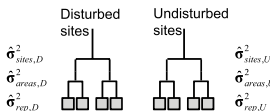
V5. Partition variation according to a series of hierarchical spatial (or temporal) scales.



Partition $\hat{\sigma}^2$ and estimate components of variation (based on dissimilarity of choice).

Additive partitioning of β_{Add} in units of richness (α), or multiplicative partitioning of β_H .

V6. Compare components of variation or effect sizes across levels of another factor or for different groups of taxa (V7).



Estimate sizes of components. Test for differences in sizes of components using separate-sample bootstraps on differences or on two-tailed pseudo-F values.